

Docket No. RID 01058RemarksAmendments to the claims

Claim 1 has been amended to correct a typographical error. The scope and patentability of the claim are not affected by the change. No new matter is introduced.

Rejections under 35 U.S.C. 103

Claims 1-8 stand rejected under 35 U.S.C. 103 as being unpatentable over Mabry in view of Hale and Jorgensen. Applicant thanks the Examiner for his careful consideration of the various references. Nonetheless, Applicant respectfully disagrees. Applicant submits that the combination of Mabry, Hale, and Jorgensen fails to disclose or suggest the subject matter of the pending claims. The Examiner notes that "the inventive concept of decreasing the density of a block so as to ease a subsequent comminuting step is well-known" (Office Action dated February 6, 2007, page 3) and states, "[T]he void volumes set forth in the claims are not established in the application as being critical" (Office Action dated February 6, 2007, page 5). Applicant respectfully disagrees. Applicant submits that the inventive concept of the present application is not merely the decrease in density of a block by, e.g., reducing a bulk block to pieces and then compressing the pieces to form a bale, but that the bale has a void density of at least 3%. Applicant further submits that the void density of 3% is set out as a preferred threshold in paragraph 0025. The application further discloses, in paragraph 0032, that a void density of at least 3% improves the processability of elastomer composite bales having a high Mooney viscosity and further discloses a preferred Mooney viscosity of at least 100.

Applicant submits that Jorgensen neither discloses nor suggests these specific thresholds. Rather, Jorgensen discloses that a powder should be reduced to about 1.3 to 2 times its density to form a bale. Jorgensen fails to disclose the void density of the bale, but this is easily determined from the data provided by Jorgensen. Because the density of the rubber is so much greater than that of air, void volume can be specified as:

$$\text{void volume (\%)} = 1 - (\text{bulk density} \div \text{rubber density})$$

Assuming a particle density of about 0.94 g/cc for the rubber of the examples (see Exhibit A), the void density disclosed by Jorgensen for a 1.97 times increase in bulk density (see Table 1, Sample 5 of Jorgensen) is about 23%. More highly compressed samples (e.g., Table 1, Sample 6) have a void density of about 9.5%. The latter is within the range recited in independent claims 1, 5, 6, and 8

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(greater than 3%). However, Jorgensen teaches that such highly compressed samples (e.g., Table 1, Sample 6 (2.30 times increase in bulk density) and Table 2, Sample 5 (1.64 times increase in bulk density; see column 6, line 53)) are not friable and therefore not acceptable.

Furthermore, Jorgensen teaches that the maximum desirable compaction is about 2 times the original bulk density. Jorgensen further notes that the maximum possible compaction varies inversely with Mooney viscosity. For example, the maximum increase in bulk density that resulted in a friable bale of material having a Mooney viscosity of 50 was 1.58 (see Table 2, Sample 4 and column 6, lines 50-59), while the maximum increase for a material having a Mooney viscosity of 80 was 1.97 (see Table 1, Sample 5 and column 6, line 17). Thus, as the Mooney viscosity increases, the degree of compaction that results in a friable bale increases. For a material having a Mooney viscosity of 100, as recited in claims 1 and 8, bales having a degree of compaction greater than 2 would still be friable. Thus, Jorgensen not only fails to disclose the thresholds recited by the claims but actually teaches against them.

In addition, the teachings of Jorgensen do not provide guidance to one of skill in the art seeking to bale strips of rubber, as recited in independent claim 5, as opposed to particles. Applicant submits that Jorgensen discloses compressing powders or crumbs made up of relatively equiaxed particles (e.g., with diameters between about 0.1 mm and about 15 mm; see column 2, line 8). While the Examiner notes that Jorgensen discloses several methods of producing the powders or crumbs (Office Action dated February 6, 2007, page 7), Applicant submits that all the disclosed methods would result in relatively equiaxed particles and that Jorgensen fails to disclose that the particles have an aspect ratio or what that aspect ratio might be. In contrast, certain of the pending claims recite that the rubber is in the form of elongated strips or pellets. For example, claim 5 recites dimensions of approximately 40 mm to 60 mm long, approximately 5 mm to 10 mm wide, and approximately 5 mm to 10 mm thick. Thus, while the Examiner notes that disclosure of a 15 mm dimension by Jorgensen overlaps the sizes set forth in the claims (Office Action dated February 6, 2007, page 5), this observation only applies to one dimension of the elongated particles, which have a length that is greater than any dimension disclosed or suggested by Jorgensen and a shape that is completely absent from Jorgensen's disclosures. Such elongated particles will compress differently than the equiaxed particles disclosed by Jorgensen whether they are compressed hydrostatically or uniaxially. Indeed, the compression factor emphasized by Jorgensen (e.g., a factor of 1.3-2), may not be appropriate for describing the compression of elongated pellets

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or strips, since, for a given magnitude of compression, the resulting porosity may vary depending on the direction of compression. Applicant submits that the processes described by Jorgensen do not teach a skilled artisan the appropriate magnitude of compression or porosity of a bale that is formed from non-equiaxed particles.

Applicant submits that while Jorgensen discloses the general concept of baling particulate rubber, he fails to disclose or suggest the specific concept of preparing a bale having a porosity of at least 3%, as recited in all the independent claims. Applicant further submits that Jorgensen fails to disclose or suggest the specific Mooney viscosity or particle shape or dimensions recited in the claims. Applicant further submits that because of this failure, one skilled in the art would not find guidance in Jorgensen of how to prepare rubber bales with such materials. As a result, Applicant submits that claims 1-9 are patentable in view of Mabry, Jorgensen, Hale, Ramos, and Chung, whether considered separately or in any combination.

A Petition for Extension of time is enclosed herewith. Please charge the appropriate large entity fee and any additional fees that may be required and refund any overpayment to our Deposit Account 03-0060.

July 17, 2007
Date

Valerie B. Rosen
Valarie B. Rosen, Ph.D.
Reg. No. 45,698
Cabot Corporation
157 Concord Road
Billerica, MA 01821
(978) 663-3455

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MatWeb, The Online Materials Database

KKPC KOSYN KNB 35H Acrylonitrile Butadiene Rubber (NBR)

Subcategory: Elastomer, TS; Polymer; Thermoset

Material Notes:

Acrylonitrile Butadiene Rubber (NBR)

Characteristics: KOSYN KNB is copolymer of high oil resistance and chemical resistance made from acrylonitrile and butadiene by the cold emulsion polymerization. Our NBR has superior working properties such as roll winding properties, compounding dispersibility and extrusion properties. Also, it is easily processed on account of the excellent vulcanization properties.

Applications: General oil-resistant Rubber Products such as packing, gasket, hose, rolls, and shoe soles.

Additional Notes:

Bound Acrylonitrile: 34%

Compound Properties: NBR 100, ZnO 3, Stearic Acid 1, HAF Black (IRB#7) 40, Accelerator TBBS 1, Sulfur 1.5, Total: 146.5

Volume Change: 0%

This product is so sensitive to sunlight and humidity that it can be tarnished and caused deterioration of quality if exposed. It is recommended to store it in cool and shady area lest it should be exposed to direct sunlight. Do not expose to incompatible materials or contaminants.

Data provided by Korea Kumho Petrochemical Co., Ltd.

Physical Properties	Metric	English	Comments
Density	0.94 g/cc	0.034 lb/in ³	Not Compounded
Mooney Viscosity	110	110	Compounded; ML1+4(100°C)
Mooney Viscosity	80	80	Raw; ML1+4(100°C)
Mechanical Properties			
Hardness, Shore A	75	75	150°C, 40 min., Pressure Vulcanization. 0% Change after 100°C, 70 hrs, Oil Immersion
Tensile Strength, Ultimate	31 MPa	4490 psi	150°C, 40 min., Pressure Vulcanization. -4% Change after 100°C, 70 hrs, Oil Immersion
Elongation at Break	510 %	510 %	150°C, 40 min., Pressure Vulcanization. -20% Change after 100°C, 70 hrs, Oil Immersion
300% Modulus	0.0157 GPa	2.28 ksi	150°C, 40 min., Pressure Vulcanization. 43% Change after 100°C, 70 hrs, Oil Immersion
Thermal Properties			
Shrinkage	0 %	0 %	after 100°C, 70 hrs, Oil Immersion

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